Amendments to the Specification:

Please amend paragraph [0004] with the following amended paragraph which deletes the ~~a~~ in line 15 below:

[0004] In an embodiment of the present invention the aforementioned problems are addressed by providing an internal combustion engine in which the compression and expansion portions of the engine's cycle and the compression and expansion ratios are independent. The present engine includes a compressor which pressurizes air by a ratio which may be substantially more than 15 to 1, a combustion cylinder including a reciprocating piston which oscillates between a top dead center position and a bottom dead center position in a power stroke and between the bottom dead center position and the top dead center position in a return stroke and a compressed air conduit for transferring compressed air from the compressor to the combustion cylinder. Pneumatic communication between the compressed air conduit and the combustion cylinder is governed by a timed valve which intermittently opens to release pressurized air into the combustion cylinder when the piston is in the second half portion of the return stroke . A fuel injector is employed to mix fuel with the pressurized air to make a fuel - air mixture which is combusted to produce hot, high pressure gaseous combustion products which expand during **[a]** the power stroke. In this present engine, because the compression of air for use in the combustion portion of the cycle is conducted separately and then injected or released into the combustion cylinder when it is needed, the ratio of compression can be significantly higher or lower than the ratio of expansion. A higher expansion ratio results in a significant increase in thermodynamic efficiency while a higher compression ratio results in a significant increase in power density. Moreover,

since the present engine conducts compression and expansion separately, compressed air for use in the combustion cylinder may be cooled to prevent early ignition of a fuel air mixture thus permitting a higher compression ratio.

Please add the following new paragraph after paragraph [0006].

[0006.1] FIG. 1A is a diagram of an embodiment of the internal combustion engine of the present invention having three combustion cylinders and two compression cylinders.

Please replace paragraph [0039] with the following amended paragraph:

[0039] Fig. 1A schematically presents an example embodiment of the present engine 10A having three combustion cylinders 70 associated on common crankshaft 76D and a compressor 12 comprising two compression cylinders 13 associated on a common compressor crankshaft 18D. In Fig. 1A, crankshaft 76D and compressor crankshaft 18D are coupled by a variable ratio gear box 12A. This variable ratio gear box may be adjusted to adjust the ~~pressure~~ volume of compressed air ~~within~~ delivered to compressed air conduit 50. The advantage of having a the capability to ~~change the pressure~~ control the delivery of the compressed air ~~with in~~ within conduit 50 are described in detail below but generally allow an adjustment in operating conditions between a mode having a relatively low volumetric compression ratio and a relatively high expansion ratio for maximum thermodynamic efficiency and a mode of relatively high volumetric

compression ratio and a relatively low expansion ratio for maximum power density. The combustion cylinders 70 of example engine 10A each include ~~intake~~ injection-valves 72A, exhaust valves 72B, fuel injectors 72C and ~~combustion~~ ignition initiators 72D. Fig. 1A also illustrates a timing system 300 for timing the operations of injection valves 72A, exhaust valves 72B, fuel injectors 72C and ~~combustion~~ ignition initiators 72D. Such a timing system is needed for the operation of an internal combustion engine but is omitted from many of the other figures for clarity. Timing system 300, in this example, includes a cam shaft 302, a fuel injection timer 304 and an ignition timer 306. Cam shaft 302 is mechanically coupled to crankshaft 76D and carries a series of eccentric cams for governing the operations of injection valves 72A and exhaust valves 72B. Fuel injection timer 304 governs the operations of fuel injectors 72C, while ignition timer 306 governs the operations of ignition initiators 72D. Both fuel injection timer 304 and ignition timer 306 are coupled to crankshaft 76D. Timing system 300 as presented here is only one of many possible timing systems and the selection here of particular types of components is not intended to limit the scope of the invention. Fig. 1A also illustrates that combustion cylinder 70 may be one of a plurality combustion cylinders coupled by a common crankshaft. Fig. 1A is not intended to suggest that compressor 12 must be a cylinder - piston type compressor or that compressor 12 would be limited to having two compression cylinders.

Please replace paragraph [0041] with the following amended paragraph:

[0041] Compressed air conduit 50 retains compressed air produced by compressor 12 and conveys compressed air to combustion cylinder 70. In the embodiment shown in Fig. 1, compressed air conduit 50 generally includes a storage means and a cooling means so that a supply of temperature conditioned pressurized air may be available for use by combustion cylinder 70. In the embodiment shown in Fig. 1, compressed air conduit 50 further includes an intake portion 52, an insulated reservoir 54, a heat rejecting portion 56 having heat rejecting fins 56A, a cool compressed air valve 60, an insulated hot air conduit 54A, hot compressed air valve 62, a pressure ~~supply valve~~ regulator 64 and an outlet portion 66. Cool compressed air valve 60 and hot compressed air valve 62 can be adjusted in order to adjust the temperature of air in outlet portion 66 as will be described in more detail below. Pressure regulator 64 is for regulating the pressure of the pressurized air in outlet portion 66. Preferably, reservoir 54 should encompass a volume sufficient to provide a steady supply of compressed air for use by combustion cylinder 70.

Please replace paragraph [0042] with the following amended paragraph:

[0042] Combustion cylinder 70 receives compressed air from compressed air conduit 50 as well as fuel which is mixed with the compressed air for combustion and expansion in a power stroke. In the embodiment shown in Fig. 1, combustion cylinder 70 is a two stroke cylinder having a piston which oscillates in a cycle including a power stroke in which the piston moves from a top dead center position to a bottom dead center

position and a return stroke in which the piston moves from the bottom dead center position to the top dead center position. Generally, the injection of compressed air from compressed air conduit 50 into combustion cylinder 70 is timed to occur during a relatively short portion of the cycle when the piston is in the second half of the return stroke. Also generally, the injection of fuel into combustion cylinder 70 is preferably timed to occur after the injection of compressed air has begun. The combustion of the fuel air mixture preferably occurs after the injection of compressed air and fuel and preferably not substantially prior to the piston reaching top dead center. In the embodiment shown in Fig. 1, combustion cylinder 70 further includes a combustion cylinder head 72, a combustion cylinder body 74 and a combustion piston 76 having an upper piston surface 76A. A connecting rod 76C links combustion piston 76 to an associated crankshaft 76D for the conversion of the reciprocating motion of the piston into rotational power at the crankshaft 76D. Combustion cylinder body 74 includes a cylindrical inside wall 74A which ~~is~~ may be penetrated by an optional exhaust port 74C. Exhaust port 74C and exhaust valve 72B are examples of typical devices or means employed for releasing exhaust from a combustion chamber. Combustion cylinder head 72 further includes ~~a pressurized air~~ an injection valve 72A, an exhaust valve 72B, a fuel injector 72C and may also include an ignition initiator 72D which in Fig. 1 is shown as a spark plug. Combustion cylinder 70 may optionally be arranged as a Diesel cylinder which compresses a mixture of air and fuel to a sufficient pressure to cause auto ignition of the mixture. As a Diesel cylinder, combustion cylinder 70 would not need ignition initiator 72D. Combustion cylinder head 72, inside wall 74A of cylinder body 74 and

upper piston surface 76A define a combustion chamber 74B which constantly changes in volume as piston 76 moves between a bottom dead center position as shown in Figs. 3H or 4H and a top dead center which would appear to be half way between the positions shown in Figs. 3E and 3F or Figs 4E and 4F.

Please replace paragraph [0043] with the following amended paragraph:

[0043] Fig. 1 illustrates combustion cylinder 70 such that ~~pressurized air~~ injection valve 72A is a conventional stem valve. Figs. 3A-3H illustrate the operation of power cylinder 70 with a conventional stem valve. With a typical prior art engine; a stem valve for regulating air intake may be open during a relatively large portion of crankshaft cycle corresponding to approximately 180 degrees of crankshaft rotation. With the present engine, ~~a pressurized air~~ injection valve 72A may be open during a relatively small portion of the crankshaft cycle corresponding to 10 to 15 degrees of the crankshaft rotation. Because of the mechanical characteristics of stem valves, the actuation of a stem valve for such a small portion of the crankshaft cycle may limit the operating RPM of power cylinder 70. Accordingly, in order to achieve higher RPMs, it would be preferable to employ a valve arrangement capable of substantially equalizing the pressure between the pressurized portion of the system such as outlet portion 66 of compressed air conduit 50 and combustion chamber 74B during a relatively small portion of the crankshaft cycle. Figs. 3J - 3N illustrate an indexed rotary valve 82 adapted for filling combustion chamber 74B with pressurized air during a relatively small portion of the cycle. Also shown in Fig. 3I is an example timing system 300 which includes a timing

chain 300B coupled to crankshaft 76D for driving a cam shaft 302 for actuating exhaust valve 72B, a timing sensor 300A associated with drive wheel 92 of rotary valve 82 which is also driven by timing chain 300B and a timing unit 305 which receives input from timing sensor 300A for controlling the timing of fuel injector 72C and ignition initiator 72D.

Please replace paragraph [0045] with the following amended paragraph:

[0045] The purpose of indexing portion 90 is to cause the intermittent (or "indexed") 90 degree rotation of valve body 88 during a 90 degree portion of a complete cycle of constantly rotating crankshaft 76D. Indexing portion 90 includes a drive wheel 92 mechanically coupled to crankshaft 76D for constant rotation and an index wheel 94 mechanically coupled to valve body 88 for intermittent, indexed rotation. Drive wheel 92 includes a cog 92A and a ~~scalloped~~ retaining disc 92B having a scalloped portion 92C and a non-scalloped circular retaining portion 92D. Index wheel 94 includes slots 94A for receiving cog 92A and external scallops 94B for receiving non-scalloped retaining portion 92D of retaining disc 92B. Figs. 3K-3N illustrate the relative motions of continuously rotating drive wheel 92 and intermittently rotating index wheel 94. Valve housing 86 has been removed in Figs. 3K-3N for clarity. In Fig. 3K, drive wheel 92 is beginning a period of rotation in which it rotates clockwise for 270 degrees while index wheel 94 remains stationary in a position that blocks communication between inlet passage 86C and combustion cylinder 70. In Fig. 3L, cog 92A of drive wheel 92 has traveled clockwise 270 degrees and begins to engage slot 94A of index wheel 94 thus

causing index wheel 94 to begin rotating in a counter clockwise direction. In Fig. 3M, index wheel 94 is rotating at a high speed relative to crankshaft 76D and drive wheel 92. The relative positions of valve body 88 and valve housing 84 illustrated in Fig. 3M are also shown in the cross sectional view of Fig. 3J. In Fig 3N, index wheel 94 has advanced 90 degrees from the position shown in Fig. 3M and is again stationary while continuously rotating drive wheel 92 has returned to the position shown in Fig. 3K. Fig. 3P provides plot which interrelates the rotational velocity of crankshaft 76D, which is constant, and the rotational velocity of valve body 88 which varies greatly during a 90 degree portion of the crankshaft cycle. The mechanism described here for driving the rotary valve is commonly known as a Geneva wheel mechanism and is only one of many possible ways to accomplish the above stated objective, which is, to open communication between a pressurized volume and combustion chamber 74B in a rapid and intermittent manner during a relatively small portion of the crankshaft cycle and to open such communication sufficiently to allow the substantial equalization of air pressure between the pressurized volume of the system and the combustion chamber.

Please replace paragraph [0046] with the following amended paragraph:

[0046] FIG. 1 shows compression cylinder 13 almost half way through ~~and~~ an intake stroke and combustion cylinder 70 at the beginning of the second half of the return stroke. However, these relative positions are not intended to imply a relationship between

the two cylinders. In FIG. 1, no direct mechanical connection is shown between compression cylinder 13 and combustion cylinder 70. Compression cylinder 13 and combustion cylinder 70 can be coupled by a common crankshaft or could be coupled such they operate at substantially different speeds. The applicant intends however, that a portion of the power derived from the operation of combustion cylinder 70 be used to power compressor 12.

Please replace paragraph [0054] with the following amended paragraph: (This revision adds a comma between the numbers 2 and 3 in line 3 below.)

[0054] As noted above, in FIG. 5 and FIG. 6, the thermodynamic cycle for a typical prior art Otto cycle engine is represented by a cycle that follows a path including state points 1, 2, 3 and 4. Compression occurs between state points 1 and 2., combustion occurs between state points 2 and 3, expansion of combustion gasses occurs between state points 3 and 4 and the exhaust of the gaseous combustion products occurs between state points 4 and 1. Generally, in a typical prior art engine, thermodynamic efficiency is understood as the ratio of the useful work captured between state points 3 and 4 and the energy input needed for compression and fuel combustion occurring between state points 1 and 3.